AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application.

1 1. (Currently Amended) A method for allocating resources to a plurality of applications,
2 comprising:
3   determining, by a computer, available resources of a networked computing system,
4 wherein the available resources comprise processing resources, networking resources, and
5 storage resources;
6   determining, by the computer, for each application, required resources of the application;
7   determining, by the computer, an assigned subset of the available resources for each
8 application as a function of the required resources of the application and the available resources,
9 wherein <u>determining the assigned subset of available resources for each application is based on a</u>
10 <u>linearized objective</u> ~~the~~ function <u>that</u> reduces communication delays between resources of the
11 subset of the available resources in conformance with bandwidth capacity requirements of the
12 application and in conformance with network bandwidth limitations, <u>wherein the linearized</u>
13 <u>objective function includes a linear combination of variables</u>~~and wherein determining the~~
14 ~~assigned subset of resources for each application is based on an objective function to reduce a~~
15 ~~number of network hops between processing resources in the assigned subset~~; and
16   associating the applications with the assigned subsets of resources.

1 2.-3. (Cancelled)

1 4. (Previously Presented) The method of claim 1, wherein the networking resources
2 comprise network switches.

1 5. (Cancelled)

1   6.   (Currently Amended) The method of claim [[5]]1, wherein the storage resources

2   comprise a storage area network, wherein the storage area network includes at least one pair of

3   redundant core switches coupled to storage devices, the core switches coupled to the processing

4   resources via a plurality of edge switches.

1   7.   (Currently Amended) The method of claim 6[[1]], wherein assignment of the subset of

2   available resources for each application is performed by solving a mixed-integer programming

3   problem.

1   8.   (Currently Amended) The method of claim 7, wherein the available resources include

2   network switches, and the mixed-integer programming problem reduces communication delays

3   between resources of the each subset of the available resources by reducing data traffic on

4   network links that interconnect the network switches.

1   9.   (Currently Amended) A system comprising:

2   means for determining available resources of a networked computing system, wherein the

3   available resources comprise servers, networking resources, and storage resources;

4   means for determining required resources for each application of a plurality of

5   applications;

6   means for determining an assigned subset of the available resources for each application

7   as a function of the required resources of the application and the available resources, wherein

8   determining the assigned subset of available resources for each application is based on a

9   linearized objective the function that reduces communication delays between resources of the

10   subset of the available resources in conformance with bandwidth capacity requirements of the

11   application and in conformance with network bandwidth limitations, wherein the linearized

12   objective function includes a linear combination of variablesand wherein determining the

13   assigned subset of resources for each application is based on an objective function to reduce a

14   number of network hops between servers in the assigned subset; and

15   means for associating the applications with the assigned subsets of resources.

1 10. (Previously Presented) A computer-readable medium configured with instructions for
2 causing a processor of a computer to allocate resources to a plurality of applications, comprising:
3   determining available resources of a networked computing system, wherein the available
4 resources comprise processing resources, networking resources, and storage resources;
5   determining, for each application, required resources of the application;
6   determining an assigned subset of the available resources for each application as a
7 function of the required resources of the application and the available resources, wherein
8 determining the assigned subset of available resources for each application is based on a
9 linearized objective the function that reduces communication delays between resources of the
10 subset of the available resources in conformance with bandwidth capacity requirements of the
11 application and in conformance with network bandwidth limitations, wherein the linearized
12 objective function includes a linear combination of variables and wherein determining the
13 assigned subset of resources for each application is based on an objective function to reduce a
14 number of network hops between processing resources in the assigned subset; and
15   associating the applications with the assigned subsets of resources.

1 11. (Cancelled)

1 12. (Currently Amended) The computer-readable medium of claim 10 11, wherein the
2 processing resources comprise servers each having at least one processor.

1 13. (Currently Amended) The computer-readable medium of claim 10 11, wherein the
2 networking resources comprise network switches.

1 14. (Cancelled).

1 15. (Currently Amended) The computer-readable medium of claim [[14]]10, wherein the
2 storage resources comprise a storage area network, wherein the storage area network includes at
3 least one pair of redundant core switches coupled to storage devices, the core switches coupled to
4 the processing resources via a plurality of edge switches.

1 16.   (Currently Amended) The computer-readable medium of claim 15~~10~~, wherein reducing

2 the ~~communications delay~~ communication delays between resources comprises solving a mixed-

3 integer programming problem.

1 17.   (Currently Amended) The computer-readable medium of claim 16, wherein the available

2 resources include network switches coupled with the processing resources, and the mixed-integer

3 programming problem reduces communication delays between resources of ~~the~~ each subset of

4 the available resources by reducing data traffic on network links that interconnect the network

5 switches.

1 18.   (Currently Amended) A system, comprising:

2   a plurality of network-coupled processing resources;

3   a plurality of storage resources network-coupled to the processing resources, wherein the

4 processing and storage resources are allocated to a plurality of applications;

5   a computing arrangement configured to[[,]]:

6   determine, for each application of the plurality of applications, required resources

7   of the application;

8   determining an assigned subset of the processing and storage resources for each

9   application as a function of the required resources of the application and the processing

10   and storage resources, wherein determining the assigned subset of processing and storage

11   resources for each application is based on a linearized objective ~~the~~ function that reduces

12   communication delays between resources of the subset of the processing and storage

13   resources in conformance with bandwidth capacity requirements of the application and in

14   conformance with network bandwidth limitations, wherein the linearized objective

15   function includes a linear combination of variables~~and wherein determining the assigned~~

16   ~~subset of resources for each application is based on an objective function to reduce a~~

17   ~~number of network hops between processing resources in the assigned subset~~; and

18   associate the applications with the assigned subsets of processing and storage

19   resources.

1 19.   (Original) The system of claim 18, wherein the processing resources comprise servers
2 each having at least one processor.

1 20.   (Cancelled).

1 21.   (Original) The system of claim [[20]]18, wherein the storage resources comprise a
2 storage area network, wherein the storage area network includes at least one pair of redundant
3 core switches coupled to storage devices, the core switches coupled to the network via a plurality
4 of edge switches.

1 22.   (Currently Amended) The system of claim 21~~18~~, wherein the computing arrangement is
2 configured to determine ~~the~~ each assigned subset by solving a mixed-integer programming
3 problem.

1 23.   (Original) The system of claim 22, wherein processing resources are coupled by network
2 switches, and the mixed-integer programming problem reduces communication delays between
3 resources by reducing data traffic on network links that interconnect the network switches.

1 24.   (Previously Presented) The method of claim 1, wherein the required resources of each
2 application is specified in resource requirements that include attributes of the processing
3 resources, wherein the attributes specify processor type and processor speed.

1 25.   (Previously Presented) The method of claim 24, wherein the resource requirements
2 further specify storage patterns of files for each application, wherein determining the assigned
3 subset is based on the resource requirements.

1 26.   (Previously Presented) The computer-readable medium of claim 10, wherein the required
2 resources of each application is specified in resource requirements that include attributes of the
3 processing resources, wherein the attributes specify processor type and processor speed.

1   27.   (Previously Presented) The computer-readable medium of claim 26, wherein the resource

2   requirements further specify storage patterns of files for each application, wherein determining

3   the assigned subset is based on the resource requirements.

1   28.   (New) The method of claim 1, wherein the network bandwidth limitations are expressed

2   as linear constraints, and wherein determining the assigned subset of the available resources for

3   each application is a linear optimization problem.

1   29.   (New) The method of claim 28, wherein determining the assigned subset of the available

2   resources for each application is a mixed integer programming problem.

1   30.   (New) The method of claim 1, wherein determining the assigned subset of the available

2   resources for each application is based on the linearized objective function to reduce a number of

3   hops between processing resources in the assigned subset.

1   31.   (New) The method of claim 1, wherein the linearized objective function is provided by

2   substituting products of binary variables in a non-linear objective function with replacement

3   binary variables in the linearized objective function.

1   32.   (New) The computer-readable media of claim 10, wherein the network bandwidth

2   limitations are expressed as linear constraints, and wherein determining the assigned subset of

3   the available resources for each application is a linear optimization problem.

1   33.   (New) The computer-readable media of claim 32, wherein determining the assigned

2   subset of the available resources for each application is a mixed integer programming problem.

1   34.   (New) The computer-readable media of claim 10, wherein determining the assigned

2   subset of the available resources for each application is based on the linearized objective function

3   to reduce a number of hops between processing resources in the assigned subset.

1   35.   (New) The computer-readable media of claim 10, wherein the linearized objective

2   function is provided by substituting products of binary variables in a non-linear objective

3   function with replacement binary variables in the linearized objective function.